ORGANIZATION AND METHODS

OF THE

UNITED STATES LIFE-SAVING SERVICE

BY

SUMNER I. KIMBALL

GENERAL SUPERINTENDENT
OF THE SERVICE.

READ BEFORE THE COMMITTEE ON LIFE-SAVING SYSTEMS AND DEVICES, INTERNATIONAL MARINE CONFERENCE :: :: :: :: :: NOVEMBER 22, 1889

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TREASURY DEPARTMENT,
LIFE-SAVING SERVICE,
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The following paper, which was read before the committee on life-saving systems and devices, International Marine Conference, November 22, 1889, by S. I. Kimball, General Superintendent of the United States Life-Saving Service, is published for the information of officers and employees of the Service and others interested.

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ORGANIZATION AND METHODS OF THE UNITED STATES LIFE-SAVING SERVICE.[1]

The sea and lake coasts of the United States, exclusive of the coast of Alaska, have an extent of more than 10,000 miles. There are to-day upon these coasts 226 life-saving stations, 165 of which are on the shores of the Atlantic, 8 on the shores of the Gulf of Mexico, 8 on the shores of the Pacific, and 45 on the shores of the Great Lakes. There is, besides, a station at the Falls of the Ohio River at Louisville, Ky. These stations are located at selected points of danger to shipping, and vary somewhat in character, according to their environment and the nature of the service demanded of them. On some portions of the coast they are placed only at long intervals, while upon others they form chains of contiguous posts within communicating distance of each other.

From the eastern extremity of the coast of Maine to Race Point on Cape Cod, a distance of 415 miles, there are but 16 stations, 10 of these being located at the most dangerous points on the coast of Maine and New Hampshire, which, although abounding with rugged headlands, islets, rocks, reefs, and intricate channels that would naturally appear to be replete with dangers, are provided with numerous harbors and places of shelter in which, upon short notice, vessels can take refuge. The portion of the Massachusetts coast included, although less favored with safe resorts, enjoys the excellent guardianship of the Massachusetts Humane Society—a venerable institution, operating under the volunteer system. On account of this protection, the General Government has deemed it proper to place its stations within this territory only at points where wrecks are unusually frequent; at least, until other dangerous parts of the coast shall have been provided for.

Cape Cod, a narrow strip of sand, stretches directly out into the ocean some 40 miles, then abruptly turns to the north for an equal distance, and, like a threatening arm, fiercely menaces the commerce of the principal port of New England. Its eastern borders of shifting sand bars fringe an unbroken line of sandy beaches, which have become the burial ground of unnumbered craft. Here 10 stations are located nearly equidistant, and designed to cooperate with each other.

[1] See addenda, p. 38.

From Monomy—the elbow of the cape—to Montauk Point, a distance of 110 miles, the coast is again somewhat similar to that of Maine, and is provided with but 9 stations.

The ocean shores of Long Island and New Jersey, one about 120 and the other 130 miles in length, form nearly a right angle, one side of which faces southeasterly and the other easterly, the vertex being at the entrance to the harbor of the great commercial metropolis of the nation. The southern portion of the New Jersey coast also borders the entrance to Delaware Bay, which is traversed by the shipping of Philadelphia and Wilmington. The coast line throughout nearly its whole extent consists of a narrow strip of sand beach, varying in width from a fourth of a mile to 5 miles, and separated from the mainland by narrow thoroughfares that sometimes expand into considerable bays. This strip is unbroken except by shallow inlets connecting the ocean with the inland waters, and by the entrance to New York Harbor, as before stated. At a distance of from 1 to 400 yards from the shore it is bordered by outlying sand bars, over which, in violent storms, immense walls of surf continually form and break. Its shores, exposed to all easterly storms, are constantly skirted by vessels bound into and out of the ports of New York, Philadelphia, and Wilmington, and by craft of the coasting trade. Their sands have always levied a fearful tribute upon the passing commerce, and are literally strewn with the half-buried and decaying skeletons of wrecked vessels, while the graveyards of the coast villages and settlements abound with unmarked mounds that tell a sorrowful tale of the destruction of human life. Here, therefore, the number of stations is increased, 39 being placed upon the coast of Long Island and 40 upon the New Jersey coast.

A similar formation marks the coast from Cape Henlopen to Cape Charles, and from Cape Henry to Cape Fear. On the first of these sections, a distance of 116 miles, 16 stations are located, while from Cape Henry to Cape Hatteras, a stretch of 121 miles, there are 23 stations. These guard a portion of the ocean commerce of Philadelphia, all that of Baltimore and Norfolk, and the coastwise shipping.

Between Cape Hatteras and Cape Fear, 175 miles, 6 stations are placed, for the protection of the commerce of Beaufort and Wilmington, N. C., and for the benefit of coasting vessels liable to disaster upon these stormy capes.

From Cape Fear as far south as the peninsula of Florida there are no stations, with the exception of one on Morris Island, at the entrance to Charleston Harbor, their protection not being needed, for the reason that the westerly trend of the coast from Cape Hatteras to Florida takes it distant from the track of vessels not bound to or from the local ports. The climate is also much milder than in the higher

titudes, being almost perennial summer; consequently, shipwrecks re less frequent.

On the coast of Florida, when vessels strand, they usually come well o to the shore, so that sailors find little difficulty in reaching the land. ntil of late, however, these shores were almost uninhabited, and mar- ers cast upon them were exposed to the terrors of starvation and irst. On this account there are provided for their relief 10 stations f an exceptional type, denominated houses of refuge. There is, how- er, a completely equipped station at Jupiter Inlet, a somewhat ngerous point.

Along most of that portion of the coast of the Gulf of Mexico lying ithin the United States the water is shoal for a great distance from ore, the soundings regular, and the coast line generally low, arshy, or sandy. The dangerous gales are the "northers," so well nown to seamen who frequent the Gulf, and these force vessels off d not on shore, except where a portion of the coast of Texas runs early north and south. This portion is exposed to the effects of ese storms, especially if the wind is a little quartering from the st, and here are appropriately established four stations. There is so a station at the entrance to Galveston Harbor, where many ssels have been wrecked upon the bar, and at unusually exposed ints two others.

The Pacific coast is not a dangerous one. From the southern undary of the United States as far north as San Francisco the mate is remarkably bland and shipwrecks are of rare occurrence. he remainder of the coast line, extending northward to the Straits Fuca, is very regular, bold, and unbroken, and contains but few rbors. The prevailing winds are mostly from a common quarter, owing not toward the shore, but southward, along its line, with most the regularity of monsoons. The weather, therefore, is easily recast, and navigation can not in general be regarded as hazardous. here are, however, a few extremely dangerous points, mostly situ- ed at the entrances to the important ports. These are guarded by ght stations.

The cluster of inland seas known as the Great Lakes contains an ea of about 80,000 square miles and has a coast line within the nits of the United States of nearly 2,500 miles. These seas are en to navigation about eight months in the year, at other times ing closed by ice, although one or two steamers cut their way ross Lake Michigan at intervals throughout the winter. There are w natural harbors, but a large number of artificial ones. These e formed at the mouths of rivers by extending piers from their nks out into the lake for a considerable distance and dredging the ttom between. The Lakes are generally tranquil, but at certain asons are visited by violent gales which throw their fresh waters

into furious convulsion with a suddenness unknown upon the ocean. Vessels unable to hold their own against the severity of these storms, being landlocked and with scant sea room, are likely to be left with only the choice between stranding wherever they may be driven and seeking refuge in the harbor that seems most accessible. The latter course is naturally the one taken. To effect an entrance within the narrow space between the piers at such times with sailing vessels, and even with steamers, is frequently a task of extreme difficulty, and the luckless craft are liable to strand upon the bar on one or the other side of the piers and meet their destruction. At some of these harbors many disasters occur in a single day.

The numerous severe gales attending the opening and closing of navigation in the early spring and late fall cause great numbers of wrecks from the enormous shipping of the Lakes. As the strandings usually occur near the harbors, however, the number of stations required is not so large as it would be if they were distributed more generally along the shore. The number at present is, as I have stated, 45.

At Louisville, Ky., dangerous falls occur in the Ohio River, across which a dam has been constructed with two wide openings or chutes to facilitate the descent of vessels, the ascent being accomplished through a canal provided with locks. This dam is a source of danger to boats attempting to cross the river to the city of Jeffersonville, as they are liable to be sucked down by the chutes or swept over its verge. Larger vessels are also exposed to danger if they become disabled or unmanageable. For this reason it has been found advisable to moor here a floating station of a unique character.

The remaining few stations are located at various points which have seemed to need their protection. There are 8 stations now in course of construction and 20 others authorized to be hereafter built at various isolated points of danger. When these are completed this form of protection will have about reached the practical limit of the present necessities of our commerce.

The stations upon the ocean beaches are generally situated among the low sand hills common to such localities sufficiently back of high-water mark to be safe from the reach of storm tides. They are plain structures, designed to serve as barracks for the crews and to afford convenient storage for the boats and apparatus. Most of those upon the Long Island and New Jersey coasts have been enlarged from the boathouses put up to shelter the boats and equipments provided for the use of volunteers before regular crews were employed. Those built later are more comely in appearance, while a few, located conspicuously at popular seaside resorts, make some pretensions to architectural taste. They are all designated by names indicating their localities.

In the majority of stations the first floor is divided into four rooms—a boat room, a mess room (also serving for a sitting room for the men), a keeper's room, and a storeroom. Wide, double-leafed doors and a sloping platform extending from the sills to the ground permit the running out of the heavier equipments from the building. The second story contains two rooms—one is the sleeping room of the men; the other has spare cots for rescued people and is also used for storage. The more commodious stations have two additional rooms—a spare room and a kitchen. In localities where good water can not be otherwise obtained cisterns are provided for water caught from the roof. There surmounts every station a lookout or observatory, in which a day watch is kept. The roofs upon the stations on those portions of the coast exposed to view from the sea are usually painted dark red, which makes them distinguishable a long distance offshore. They are also marked by a flagstaff 60 feet high, used in signaling passing vessels by the International Code.

The stations (other than the houses of refuge) are generally equipped with two surfboats (supplied with oars, lifeboat compass, and other outfits), a boat carriage, two sets of breeches-buoy apparatus (including a Lyle gun and accessories), a cart for the transportation of the apparatus, a life-car, 20 cork jackets, 2 heaving sticks, a dozen Coston signals, a dozen signal rockets, a set of the signal flags of the International Code, a medicine chest with contents, a barometer, a thermometer, patrol lanterns, patrol checks or patrol clocks, the requisite furniture for rude housekeeping by the crew and for the succor of rescued people, fuel and oil, tools for the repair of the boats and apparatus and for minor repairs to the buildings, and the necessary books and stationery. At some of the stations the Hunt gun and projectiles are supplied, and at a few the Cunningham rocket apparatus. To facilitate the transportation of boats and apparatus to scenes of shipwreck a pair of horses is also provided at stations where they can not be hired, and to those stations where the supplies, mails, etc., have to be brought by water a supply boat is furnished.

All the stations on the ocean coast of Long Island, 29 stations on the coast of New Jersey, 9 stations on the coast between Cape Henlopen and Cape Charles, and all the stations between Cape Henry and Hatteras Inlet are connected by telephone lines.

The few Lake stations located upon the sand beaches are similar in all respects to those upon the seacoast, but those situated at the harbors differ from them in that room is provided for a heavy lifeboat and for a small boat for quick work in the immediate vicinity of the station. The buildings are usually located not far from the water's edge, behind one of the piers of cribwork forming the sides of the harbor entrance. An inclined platform, upon which are laid two tramways for the launching of the boats, extends from the boat room

down to the water through an opening cut in the pier. Cradles or cars are provided, on which the boats are kept mounted and by which they can be put afloat with the men at their oars in half a minute. Exit for the surfboat wagon and apparatus cart is also provided in the rear of the building, in case it should be necessary to transport them along the shore. These stations usually have telephone connection with the systems of the adjacent towns.

The houses of refuge on the Florida coast are simple dwellings, not unlike those common at the South, with capacity sufficient for the residence of a family, and for the temporary shelter of as many as are likely to need it. The distance between them averages 26 miles, and at each mile along the coast are placed guideposts indicating the distance and direction to the nearest station. The houses are supplied with cots and provisions sufficient to succor 25 persons for 10 days. No boats or apparatus are provided, except a small galvanized-iron boat for the use of the keeper.

The floating station at Louisville is a scow-shaped hull, on which is a house of two stories surmounted by a lookout. Besides the housekeeping furniture there are but few equipments; two boats, called life skiffs, and two reels, each with capacity to hold a coil of 5-inch manila rope, and so placed in the boat room that a line can be speedily run out from either, or, if desired, that they can be rolled out of the boat room, with the lines upon them, for use elsewhere. The station is usually moored above the dam at a place which will afford the readiest access to boats meeting with accident, but it can be towed from place to place when necessity requires, as was the case in the great floods of 1883–84, when it was of incalculable service in rescuing people from the upper stories and roofs of their inundated dwellings and in distributing food to the famishing. On these two calamitous occasions the crew of this station rescued and took to places of safety over 800 imperiled persons, men, women, and children—among them many sick and infirm—and supplied food and other necessaries to more than 10,000.

The station buildings upon the coast are all constructed with a view to withstand the severest tempests. Those located—as many necessarily are—where they are liable to be undermined or swept from their positions by the ravages of storms and tidal waves are so strongly put together that they may be overthrown and sustain but trifling injury. There are instances on record where they have been carried a long distance inland—in one case a half a mile—without sustaining material damage. This substantial construction also enables them to be easily and cheaply moved when threatened by the gradual encroachment of the sea, which, upon many sections of the coast, effects in the course of years great changes in the configuration of the coast line.

Since the establishment is closely related to commerce and the collection of the revenue, it is attached to the Treasury Department, which discharges all executive functions of that character. It has, indeed, from its earliest inception been formed and fostered by that department. The present system was established in 1871, upon the New Jersey and Long Island coasts, by a code of regulations under the authority of somewhat scattered and fragmentary legislation. Acts of Congress passed since that time have extended it to embrace the entire ocean and Lake coasts, which are divided into 12 districts, limited in general by prominent natural or political boundaries.

The chief officer of the Service is the General Superintendent, whose appointment is made by the President and confirmed by the Senate. No one is eligible to the position who is not familiar with the means employed in the Service for the saving of life and property from shipwreck. The law places no limit upon the tenure of this officer, which is therefore subject to the pleasure of the President. He has general charge of the Service and of all administrative matters connected with it. His compensation is $4,000 per annum. An assistant general superintendent, appointed by the Secretary of the Treasury, assists him, and in his absence performs his duties. His compensation is $2,500 per annum.

The office of the General Superintendent is in Washington, where, to assist in the transaction of business, are employed a corps of clerks, a civil engineer, a topographer and hydrographer, and a draftsman. To assist the General Superintendent in investigating devices and inventions for the improvement of life-saving apparatus there has been formed a Board on Life-Saving Appliances, composed of experts selected from the Life-Saving Service and others. It is their duty to examine and report upon such devices as may be submitted to them.

The next official in rank to the General Superintendent is the Inspector, an officer detailed from the Revenue-Cutter Service upon the request and recommendation of the General Superintendent. His headquarters are in New York City. Besides making periodical inspections of the stations, he performs such other duties in connection with the conduct of the Service as the General Superintendent may direct. Nearly all the self-bailing and self-righting lifeboats are built in New York, and most of the apparatus is manufactured there. He is, therefore, required to inspect and superintend the work upon these. Under the system pursued by the Government for making purchases of goods for its use, a large proportion of the outfits and supplies for the stations are obtained in that city, and these he is also required to inspect. An assistant inspector is detailed to the office of the Inspector, and in his absence acts for him. Such other assistance as is found necessary is also allowed.

An assistant inspector is also detailed from the Revenue-Cutter Service for each district. He is authorized to perform within his district any of the duties of the Inspector under the latter's direction. He visits each station monthly during the "active season," and upon each visit, in addition to the ordinary routine of inspection, he examines and practices the crews in their duties. On his first tour after the opening of the stations in each year he examines the keepers and men as to the required qualifications, reporting for dismissal any found wanting. Upon each succeeding visit he makes a similar examination of all persons who have entered the Service since his previous visit. He makes special visits to any of the stations when necessary. Whenever a shipwreck attended with a loss of life occurs within the domain of the Service, an assistant inspector is detailed to carefully investigate all the circumstances connected with the disaster, with a view of ascertaining its cause, and whether the officers or employees of the Service have been guilty of neglect or misconduct. The results of these investigations are published in the annual reports. The Inspector and assistant inspectors receive no other compensation than that pertaining to their rank in their own corps.

Each district is under the immediate charge of a superintendent, and for the coast of Rhode Island—a portion of the third district, widely separated by water from the other portion and from the adjacent district, but not large enough to form a district by itself—there is an assistant superintendent. These officers must be men of good character and correct habits, not less than 25 nor more than 55 years of age when appointed; able to read and write English readily, and have sufficient knowledge of accounts to properly transact the district business. They must be residents of the respective districts for which they are chosen, familiar with the line of coast embraced within them, and conversant with the management of lifeboats and other life-saving appliances. They are rigidly examined as to these qualifications by the General Superintendent and the Inspector. They are disbursing officers and paymasters for their respective districts, and are required to enter into bonds varying in amount from $10,000 to $50,000, according to the fiscal responsibility placed upon them. They are also ex officio inspectors of customs. They conduct the general business of their districts, look after the needs of the stations, make requisition on the General Superintendent for station supplies, repairs, etc., and upon receipt of authority see that these are furnished. They visit the stations at least once a quarter to acquaint themselves with their condition. On these occasions they pay off the crews and make such other disbursements as are authorized. As inspectors of customs they look after the interests of the Government in reference to dutiable property wrecked within their jurisdiction, and see that the keepers of stations perform their duties in respect thereto. Their compensation

ranges from $1,000 to $1,800 per annum, and is designed to be proportionate to the extent of their duties and to the degree of fiscal responsibility incumbent upon them severally.

Each station has a keeper who has direct control of all its affairs. The position held by this officer will be recognized at once as one of the most important in the Service. He is, therefore, selected with the greatest care. The indispensable qualifications for appointment are that he shall be of good character and habits, not less than 21 nor more than 45 years of age; have sufficient education to be able to transact the station business; be able-bodied, physically sound, and a master of boat craft and surfing. He is usually nominated by the district superintendent, the initial step being left to that officer because of the extensive acquaintance he is supposed to have with the class of men from which the choice must be made, by reason of long residence among them, and because of the degree of responsibility resting upon him for the condition and conduct of his district. So much depends, however, upon the selection that an effort is made to eliminate, as far as possible, the chance that any political, social, or personal interests shall intentionally or unintentionally enter into it. In the vicinity of nearly all the stations there are numbers of fishermen and wreckers who have followed their callings from boyhood and become expert in the handling of boats in broken water, and among these there is usually some one who, by common consent, is recognized as a leader par excellence. He is the man it is desirable to obtain for keeper, unless there be some fault of character which should exclude him. The nomination is accompanied by a statement of the reasons which guided the district superintendent in his choice, and a certificate of the candidate's physical soundness, made by a surgeon of the Marine-Hospital Service, after careful examination. Before granting his approval the General Superintendent submits the nomination to the district inspector for his views, and if after thorough inquiry he concurs, the General Superintendent approves and the appointment is made. If he does not concur, and his stated reasons seem to justify his conclusion, the General Superintendent takes such action as he deems best, either calling upon the district superintendent to submit another nomination, or visiting the locality himself and seeking out the proper person. It is gratifying to be able to state, and it is an evidence of the singleness of purpose and strict appreciation of duty which actuate both the district officers, that difference of opinion in reference to a nomination has rarely arisen between them.

It is not found difficult to fill vacancies that occur among the keepers at old stations, or along that portion of the coast where the stations are contiguous. Either from the crew where the vacancy exists, or from a neighboring one, there is selected the most competent surfman, the merits of all having been ascertained by inspection and

drill and recorded in the central office. Rarely, it is considered for the best advantage and welfare of the service to take some person from without; in which case the district officers are required to set forth specifically all the facts upon which this conclusion is based. The original selection of keepers for new stations remote from others is less easily determined.

The keepers are required to reside constantly at their stations; are intrusted with the care and custody of the station property, for which they are accountable; and govern the station premises. They are captains of their crews; exercise absolute control over them (subject only to the restriction of the regulations of the service and the orders of superior officers); lead them and share their perils on all occasions of rescue, taking always the steering oar when the boats are used, and directing all operations with the apparatus. They are also ex officio inspectors of customs, and as such take care of the Government interests in relation to dutiable goods on wrecked vessels, until the arrival of other customs officers. By law they are also made guardians of all wrecked property until relieved by the owners or their agents, or until instructed by superior authority as to its disposition.

No crews are employed at houses of refuge, but the keepers and their families travel after storms as far as practicable along the shore in both directions from the stations, searching for persons possibly cast ashore.

A daily journal or log is required to be kept at every station, weekly transcripts of which the keeper sends through the district superintendent to the General Superintendent, who is thus kept advised of all that transpires. Immediately after the occurrence of a wreck the keeper furnishes a complete report of every detail of interest concerning the disaster, and from time to time various other reports are required of him. Any false statement made in the books or reports subjects him to instant dismissal.

The Secretary of the Treasury is authorized to grant the keepers a compensation not to exceed $800 per annum. The maximum amount is paid only to one or two, whose stations are so isolated that they are obliged to secure an associate to reside with them when the crews are off duty, and to such keepers as have remarkably distinguished themselves by bravery and effective service. The usual salary paid is $700 per annum; to keepers of houses of refuge, only $400.

The law provides that the stations on the Atlantic and Gulf coasts shall be opened and manned for active service from the 1st day of September in each year until the 1st day of the succeeding May, and those on the Lake coasts from the opening to the close of navigation, usually from about the 15th of April to about the 15th of December. On the Pacific coast the period is left discretionary with the General

Superintendent. The time during which the stations are manned is designated the "active season." Four of the stations on the Pacific coast are kept open the year round, experience having shown that disasters in their neighborhood occur more frequently from local causes than from stress of weather, and are about as liable to happen at one season as at another. For similar reasons a crew is kept continuously at the Louisville station.

The number of men composing the crew of a station is determined by the number of oars required to pull the largest boat belonging to it. There are some five-oared boats in the Atlantic stations, but at all of them there is at least one of six oars. Six men, therefore, make up the regular crews of these stations, but a seventh man is added on the 1st of December, so that during the most rigorous portion of the season a man may be left ashore to assist in the launching and beaching of the boat and to see that the station is properly prepared for the comfortable reception of his comrades and the rescued people they bring with them on their return from a wreck; also to aid in doing the extra work that severe weather necessitates. Where the self-righting and self-bailing boat which pulls eight oars is used, mostly at the lake stations, a corresponding number of men is employed.

The crews are selected by the keepers from able-bodied and experienced surfmen residing in the vicinity of the respective stations. This privilege is granted the keepers in view of the obvious necessity for mutual confidence between a leader and his followers in hazardous enterprises involving their own lives and the lives of others, and in view of the strict responsibility to which each keeper is held for the good repute of his station and the conduct of its affairs.

In the absence of strong counteracting inducements these considerations would naturally lead to the choice of the very best men to be had. It was early found, however, that political, social, and family influences were often strong enough to so control the selection as to materially affect the efficiency of a crew. To oppose them certain regulations were established, the most important of which provided that the selection of keepers and crews should be made solely with reference to their fitness and without regard to their party affiliations. This, after being enforced for several years, received in 1882 the sanction of Congress, being at the same time extended to the appointment of district superintendents and inspectors. This enactment greatly aids successful resistance to the most insidious and potent evil that has ever threatened the welfare of the service. Another important regulation forbids a keeper to take into his crew his brother, father, or son, except where adherence to the rule would be detrimental to the Service. This was found necessary to countervail the quite natural inclination of keepers to provide situations for

their near kinsmen, even to the serious detriment of the strength and morale of the station force.

Protected by these and a few less noteworthy safeguards, the method adopted for manning the stations has filled them with the very pick and flower of the hardy race of beachmen who inhabit our shores. No better evidence of the virtue of the plan can be desired than the fact that during the 18 years it has governed the selection of the men not one has shown the white feather, while the pages of the annual reports of the service are crowded with the records of gallant deeds that have made them famous throughout the land.

Upon original entry into the service a surfman must be not over 45 years of age, and sound in body, being subjected to a rigid physical examination by a surgeon of the Marine-Hospital Service. He is afterwards examined as to expertness in the management of boats and matters of that character by the inspector of the district. The regulations setting forth his duties being read to him, he is enlisted by signing articles by which he agrees to reside at the station continuously during the "active season," to perform such duties as may be required of him by the regulations and by his superior officers, and also to hold himself in readiness for service during the inactive season, if called upon. Desertion entails a forfeiture of his wages, to be exacted in the discretion of the General Superintendent. His compensation is $50 per month during the "active season," and $3 for each occasion of service at other times. Beyond the wages mentioned the surfmen receive no allowances or emoluments of any kind, except the quarters and fuel provided at the stations. Their food and clothing they themselves supply.

No person belonging to the Service is permitted to hold an interest in any wrecking apparatus, or to be connected with any wrecking company; nor is he entitled to salvage upon any property he may save or assist to save.

A surfman can not be discharged from the service without good and sufficient reason. For well-proven neglect of patrol duty, or for disobedience or insubordination at a wreck, the keeper may instantly dismiss him; in all other cases special authority must be first obtained from the General Superintendent.

In case a keeper or surfman becomes disabled by injury received or disease contracted in the line of duty, he is entitled to receive his full pay during the continuance of the disability, if it does not exceed one year, and upon the recommendation of the General Superintendent the Secretary of the Treasury may extend the time for a second year, or a part thereof, but no longer in any case. If any keeper or surfman loses his life by reason of injury or disease incurred in the line of his duty, his widow or children under 16 years of age may receive for two years the pay that the deceased would

have if alive and in the Service. If the widow remarries or a child arrives at the age of 16, the amount that would have been paid to the one or the other goes to the remaining beneficiaries, if any. It will be seen at once that this beneficence affords certain advantages to the widow which the ordinary pension does not furnish, inasmuch as the death of her husband does not add to her grief the misfortune of financial embarrassment by cutting off or diminishing the family income at a time when the funeral expenses make an unusual demand upon it.

At the opening of the "active season" the men assemble at their respective stations and establish themselves for a residence of eight months. They arrange for their housekeeping, usually by forming a mess, taking turns by weeks in catering and cooking, although at some of the stations they engage board of the keeper at a rate approved by the General Superintendent. These preliminaries being settled, the keeper organizes his crew by arranging and numbering them in their supposed order of merit, the most competent and trustworthy being designated as No. 1, the next No. 2, and so on. These numbers are changed by promotion as vacancies occur, or by such rearrangement from time to time as proficiency in drill and performance of duty may dictate. Whenever the keeper is absent, No. 1 assumes command and exercises his functions.

The rank of his men being fixed, the keeper assigns to each his quarters and prepares station bills for the day watch, night patrol, boat and apparatus drill, care of the premises, etc. For the purpose of watch and patrol, the district officers establish patrol limits as far as practicable along the coast in both directions from the stations, marking them by distinct monuments, and a description of the beats thus laid out is sent to the office of the General Superintendent. The day watch is kept from sunrise to sunset by a surfman daily assigned to this duty, who is usually stationed in the lookout, and who, if the patrol limits can not be seen from there, goes at least three times a day far enough along the shore to bring them into view. During thick and stormy weather a complete patrol like that at night is maintained. At the harbor stations on the Lakes, at the river station at Louisville, and at other places where accidents are frequent, there is connected with the lookout a gong, by means of which the crew is alarmed when occasion requires. The day watch keeps a record of all passing vessels.

For the night patrol the night is divided into four watches—one from sunset to 8 o'clock, one from 8 to 12, one from 12 to 4, and one from 4 to sunrise. Two surfmen are designated for each watch. When the hour for their patrol arrives they set out in opposite directions along the coast, keeping as near as practicable to the shore, as far as the ends of their respective beats. If within communicating

distance from an adjacent station, each patrolman proceeds until he meets another from the next station and gives him a metallic check marked with his station and crew number, receiving in exchange a similar one. The checks thus collected are examined by the keeper, recorded in the journal, and returned to their proper stations the next night. If a patrolman fails to meet his fellow from the adjacent station, after waiting a reasonable time at the usual place of meeting, he continues his journey until he either meets him or reaches that station and ascertains the cause of the failure, which, on his return, he reports to his keeper, who makes a record of it in his journal.

At isolated stations each patrolman is required to carry a clock within which is fixed a dial that can be marked only by means of a key which also registers the time of marking. This key is secured to a post at the end of his beat, and he is required to reach it and bring back the dial properly marked.

Each patrolman is equipped with a beach lantern and several red Coston hand lights. Upon the discovery of a wreck, a vessel in distress, or one running dangerously near the shore, he ignites by percussion his hand light, which emits a brilliant red flame. This serves the double purpose of warning the people on the vessel of their danger and of assuring them of succor if they are already in distress.

For every week day a regular routine of duties is appointed. For Monday, it is drill and practice with the beach apparatus and overhauling and examining the boats and all apparatus and gear; for Tuesday, practice with the boats; for Wednesday, practice with the International Code of signals; for Thursday, practice with the beach apparatus; for Friday, practice in the method adopted for restoring the apparently drowned; and for Saturday, cleaning house. Whenever anything prevents the regular performance of any of these duties, the fact must be entered upon the station journal, with a full explanation, and the omitted exercise performed at the first opportunity.

For practice with the beach apparatus there is provided near each station a suitable drill ground, prepared by erecting a spar, called a wreck pole, to represent the mast of a stranded vessel 75 yards distant (over the water if possible) from the place where the men operate, which represents the shore. At drill the crew is mustered in the boat room, and each man, upon his number being called, salutes the commanding officer and recites in proper sequence every act he is to perform in the exercise as prescribed in the Service manual. At the proper words of command they all fall into their allotted places at the dragropes of the apparatus cart and draw it to the drill ground, where they perform the remainder of the exercise, which consists in effecting a mimic rescue by rigging the gear and taking a man ashore from the wreck pole in the breeches-buoy. The officer con-

ducting the drill carefully notes the time which elapses from the moment he gives the initial command "action" until the rescued man sets foot upon the shore.

If in one month after the opening of the "active season" a crew can not accomplish the rescue within five minutes, it is considered that they have been remiss in drilling or that there are some stupid men among them. They are cautioned that if upon the next visit of the inspector a marked improvement is not shown some decisive action will be taken to secure it. This usually produces the desired effect. In many of the districts a spirited rivalry exists between the stations for excellence in this drill. It has been executed without error by several crews in two minutes and thirty seconds. I confess I was incredulous of the possibility of such a feat until I witnessed it myself; but even this is perhaps less surprising than the time attained at some of the night drills, when, without lights other than the moon and stars, the shot has been fired, the apparatus set up, and a man brought ashore from the wreck pole in three minutes. Of course, nothing like such celerity can be expected in effecting rescues at actual shipwrecks, when storms, currents, surf, the motion of the vessel, the lack of skillful cooperation on the wreck, and many other unfavorable elements conspire to obstruct progress, and the practice of timing the drill was instituted not so much with the expectation of materially hastening the work of rescue as with the design of giving the men the utmost familiarity with the stowage of the apparatus in the cart, with its uses, and with the method of handling it.

How well this purpose is fulfilled has been repeatedly illustrated on occasions of rescue, but never better than in the memorable storm of February 3, 1880, which wrought general ruin and devastation upon the coast of New Jersey and strewed her shores with wrecks. In the very height of that terrible tempest, at the dead of night, the crews of three separate stations rescued without mishap the people on four different vessels by means of the apparatus, set up and worked in almost utter darkness, the lanterns of the surfmen being so thickly coated with sleet that they emitted only glimmers of light so feeble that the lines and implements could not be seen. These and the other rescues achieved in that storm excited such public admiration that the State legislature unanimously passed resolutions commending the skill and bravery of the station crews.

Boat practice consists in launching and landing through the surf and at least a half hour's exercise in handling the oars under the keeper's direction.

Drill in signaling is conducted by interrogating each surfman as to the meaning of the various flags, the definitions of two-, three-, and four-flag hoists, the distinguishing flag or pennant of each hoist, the use of the code book, and by actual conversation carried on by means

of two sets of miniature signals provided for each station. Frequent practice is also had between the stations and revenue vessels.

The method adopted for restoring the apparently drowned is formulated into four rules which each member of the crew commits to memory. In drill he is required to repeat these and afterwards illustrate them by manipulations upon one of his comrades. The medicine chest is also opened, and he is examined as to the use of its contents.

The proficiency of every keeper and surfman in the several branches of qualification in which he is thus trained, as ascertained in the drills conducted by the district inspectors on their monthly visits, is marked by those officers in their drill books upon a scale of 10; and transcripts of this rating are transmitted to the General Superintendent, who is thus kept constantly informed of the effectiveness of the corps.

The ultimate means employed by life-saving institutions to rescue people from stranded vessels are everywhere essentially the same. The tumultuous waters between the wreck and the shore are either crossed by a lifeboat sent out to the imperiled people or are spanned by strong lines by which a breeches-buoy or other vehicle is passed back and forth. There are many kinds of lifeboats, however, and various devices for effecting line communication. The type of boat in most general use in our service, although properly entitled to be called a lifeboat, is distinctively known as the surfboat, and this term will be applied to it in the remarks which follow upon this topic. There are several varieties of this type, all developments of the boat found in use among the shore fishermen or surfmen of the Long Island and New Jersey coasts for crossing the surf on the outlying sandbars in their daily blue fishing when the first boathouses or stations were placed there. Three varieties, respectively designated the Beebe, the Higgins & Gifford, and the Beebe-McLellan surfboat, from the names of the persons who devised the modifications which characterize them, are the only ones furnished to the stations in recent years. They are all constructed of white cedar with white-oak frames, and their dimensions are from 25 to 27 feet in length, $6\frac{1}{2}$ to 7 feet beam, 2 feet 3 inches to 2 feet 6 inches depth amidships, and 1 foot 7 inches to 2 feet 1 inch sheer of gunwale. Their bottoms are flat, with little or no keel, and have a camber of $1\frac{1}{2}$ or 2 inches in 8 feet each side of the midship section. They draw 6 or 7 inches of water, light, and weigh from 700 to 1,100 pounds. They are propelled with six oars, without sails, and are expected to carry, besides their crews, from 10 to 12 persons, although as many as 15 have been landed at a time in a bad sea. Their cost ranges from $210 to $275. There is no great difference between the Beebe and the Higgins & Gifford boat, except that the former has more sheer and is clinker-built, while the latter is of carvel construction. The Beebe-McLel-

lan boat is the Beebe boat with the self-bailing quality incorporated. This feature has been added within the past two years, and but few of them have yet been put in service. All of these boats are so light as to be readily transported along the shore; they can be launched in very shallow water, and in the dexterous hands of our surfmen are maneuvered in the breakers with marvelous ease and celerity. This facility of handling is of great advantage when working in proximity to wrecks, enabling the boat to evade collision with floating wreckage, and to quickly slip up alongside a stranded vessel at a favorable moment and receive its freight, while it is easily fended off from contact with the lurching hull.

These boats, of one variety or other, are supplied to nearly all the stations in the service, and on the Atlantic seaboard they are relied upon almost exclusively. Indeed, the shores of soft, yielding sand without roads, and the flat beaches covered with but little depth of water for a considerable distance seaward, which almost uniformly mark the coast from Cape Cod to Cape Fear, preclude the use of boats of greater weight and draft. Even at those stations where the most approved self-righting and self-bailing boats are furnished the surfboats are generally preferred by the life-saving crews for short distances and when the number of imperiled people is not large. In executing the work required at minor casualties, such as aiding to float stranded craft by carrying out anchors, running lines to tugs, etc., they are especially handy and by their use a vast amount of property has been saved.

As respects safety they will compare favorably with any other boats. During the 18 years they have been in the hands of our crews they have been launched 6,730 times in actual service and have landed 6,735 persons from wrecked vessels. In all this service they have capsized but 14 times. Six of these instances were attended with loss of life, the number of persons perishing being 41, of whom 27 belonged to the service and 14 were shipwrecked people.

Among other lifeboats, the self-righting and self-bailing boats of the Royal National Life-Boat Institution of Great Britain, the honored mother and mentor of all existing life-saving organizations, are unquestionably preeminent. They are the product of a century's devoted study and experiment with unstinted means, dating from the time the London coachmaker first conceived the idea of a lifeboat. Their wonderful achievements have formed the theme of song and story, shed merited luster upon the institution which fostered their development, and stimulated the formation of kindred organizations equipped with their models throughout christendom. I learn from the annual reports of the institution that during the same period of 18 years her boats have capsized 21 times attended by loss of life, the number perishing aggregating 75, of whom 68 were lifeboat men

and 7 shipwrecked people. The number of capsizes unattended with loss of life I could not ascertain, except by an exhaustive search through the detailed accounts of all the occasions of service, but I find by the official report of the inquiry into the circumstances of the accidents to the Southport and St. Anne's lifeboats in December, 1886, made to the board of trade by Sir Digby Murray, baronet, and captain, the Hon. H. W. Chetwynd, of the royal navy, chief inspector of lifeboats for the Institution, that during the previous 32 years the self-righting boats of the Institution had been launched in actual service 5,000 times, whereby 12,000 lives were saved, and that on these occasions 41 of the boats had capsized, 23 of the accidents being unattended with loss of life, while 18 were accompanied with fatal results. The number of persons lost was 88, 76 being lifeboat men and 12 shipwrecked people. The report further states that "the 76 lifeboat men lost represented about 1 in 850 of the men afloat in the lifeboats on service, and the capsizes 1 out of each 120 launches on service." In the case of our capsized surfboats the 27 men lost represented 1 in 1,744 of the men afloat in the surfboats on service, and the capsizes 1 out of each 480 launches on service. But as the saving of property is an incidental duty imposed upon our crews, the surfboats, although they are not used in saving cargoes, are doubtless often launched under conditions more favorable than generally fall to the lot of the boats of the Institution, and therefore the number of launches does not afford a satisfactory basis for comparison. Let us therefore take another basis. The number of lives saved by the lifeboats is stated, as we have seen, at 12,000—in round numbers, probably. Calling the number saved by the surfboats 6,500 in round numbers, we find, then, 1 capsize of the surfboat to every 464 persons saved, a difference in its favor of 172. The self-righting boat lost 1 life to every 136 saved, the surfboat 1 to every 158 saved, a difference of 22 in its favor. Of the lifeboat men afloat, 1 to 850 were lost by the self-righting boat, 1 to 1,109 by the surfboat, a difference of 259 in favor of the latter. In the lifeboat 1 man of the crew is lost for every 157 lives saved, in the surfboat 1 for every 240 saved, a difference in favor of the surfboat of 83.

Since 1876 there have been put into the United States service 37 self-righting and self-bailing lifeboats of the model of a boat received from the Royal National Life-Boat Institution. They are all nearly reproductions of the boat sent to us. They are 29 feet 3 inches in length, 7 feet 7 inches beam, 3 feet $1\frac{1}{2}$ inches deep amidships, 1 foot 10 inches sheer of gunwale, straight-bottomed, pull 8 oars, and weigh about 4,000 pounds each. This great weight is made necessary by the device of a heavy iron keel to aid in securing the self-righting quality. They have made on service 471 trips and saved 584 persons; they have capsized on service 4 times, once with fatal results, 5 lives, all ship-

wrecked people, being lost. These figures produce results similar to those already reached in reference to the lifeboats used in Great Britain. The boats have capsized once in each 118 trips, and once in rescuing every 146 persons, and one life has been lost from the boats to every 117 saved.

There are two other varieties of self-righting and self-bailing boats in the service—the Richardson and the Dobbins. They are modifications of the lifeboat just described, though considerably lighter. They have not been used often enough to furnish any practical basis of comparison, but have given good results so far.

Notwithstanding these figures it would be unwise to hastily conclude that the surfboat of either variety mentioned is the best lifeboat for all conditions of service. Among the boats at present employed in life-saving institutions I know of none that can justly be denominated the best lifeboat. The type that is best for one locality may be ill adapted or entirely unfitted for another, and a boat that would be serviceable at one time might be worse than useless at another in the same locality.

On the larger portion of the Atlantic seaboard boat service at wrecks is not very distant from the shore, and the chief danger lurks in the line of surf which must be crossed and in the breakers on outlying shoals. For this service the surfboat is easily transported on its carriage through the loose and trackless sands of the strand to a point as near the wreck as possible, is quickly unloaded, and at a favorable time is launched in a minute. The keeper steers with a long steering oar, and with the aid of his trained surfmen, intent upon his every look and command, maneuvers his buoyant craft through the surf with masterly skill. He is usually able to avoid a direct encounter with the heaviest breakers, but if he is obliged to receive their onset meets them directly "head on." His practiced hand immediately perceives any excess of weight thrown against either bow and instantly counteracts its force with his oar as instinctively and unerringly as the skilled musician presses the proper key of his instrument. He thus keeps his boat from broaching-to and avoids a threatened capsize. The self-righting boat is more unwieldy and not so quickly responsive to the coxswain's tactics, and is therefore not so well adapted to our general work.

The usual conditions of service in the United Kingdom are probably different. The excursions the lifeboats make on service are said to be more extended, and exposure to violent gales for long periods upon the open sea more frequent. Our surfboats, it is true, venture upon outlying shoals covered with breakers, such as the Nantucket Shoals, off Massachusetts, and the Diamond Shoals, off Cape Hatteras, but it is likely that there is no such locality within the scope of our Service so fatal as the terrible Goodwin Sands, which are often

visited by the boats of the Royal National Life-Boat Institution, and where they have accomplished so much noble work. There are doubtless other important differences in the requirements of service with which I am not acquainted. Probably, therefore, the conditions are so diverse that no just conclusion as to the superiority of the two boats can be drawn from the results of their experience, and I have given these results in comparison, not with a desire to establish such a conclusion, but to show that the United States service has provided quite as effective means for dealing with the conditions presented to it as the most eminent organization of other countries has for its conditions, and because I thought they might be of service in the deliberations of the committee in considering some of the topics of the division of the program referred to it, and, further, because I thought they might aid in the efforts always being made by life-saving institutions and by individuals to improve the safety of life-saving boats. Where long excursions are to be undertaken and the service is exceptionally hazardous, the men undoubtedly feel safer in a self-righting boat, and, having this in view, it has been introduced into many of our stations, where it may be found side by side with the surfboat, the choice being left to the keepers to take either, as the occasion seems in their experienced judgment to demand.

Self-righting and self-bailing are properties unquestionably desirable in any boat designed to be used in saving life, provided they can be obtained without too greatly impairing other necessary qualities. May it not be a question worthy of consideration whether these properties and the means of propulsion by sails can not be advantageously incorporated into the surfboat without materially increasing its weight and draft, and whether such a boat would not be found to be better adapted to perform the general services of life-boats than those which sit deeply in the water, and which, on that account and because of their great weight, are less agile in action and more difficult to transport and launch? Already, as I have said, the self-bailing property has been successfully applied by Lieut. McLellan, and is hailed with delight by our crews; the addition of sails has also been accomplished by the use of a centerboard, and I am able to add that I believe the self-righting quality is on the verge of successful application. One boat of this kind is already built, and with slight changes, which seem entirely practicable, I believe will satisfactorily solve the problem, at least so far as to answer all the purposes of our Service. When this result is attained, why may not self-bailing and self-righting boats supplant the inferior boats now carried upon passenger vessels for lifeboats? And why, since it has been found that the self-bailing principle can be applied to a model thoroughly convenient to be carried on shipboard, may not these vessels even now be supplied with self-bailing boats, in which the lia-

bility to capsize is greatly diminished by reason of their ability to immediately free themselves of any water they may ship?

For effecting line communication with stranded vessels our Service chiefly employs the Lyle gun, named after Capt. D. A. Lyle, of the Ordnance Department of the United States Army, who devised it. It is to be found in every station except the houses of refuge. But the Hunt gun, devised by Mr. Edmund S. Hunt, of Massachusetts, and the Cunningham rocket, invented by Mr. Patrick Cunningham, of the same State, have been recently furnished to a few stations where the outlying bars are so far off shore that vessels may possibly strand beyond the range of the Lyle gun. This has been done, not in the belief that the beach apparatus can be effectually used at any distance beyond this range, but with the hope that a line, if thrown from the shore to a wreck, might be used to effect the passage of a boat or a life-car, or that some other means for rescue might be improvised. The Lyle gun is of bronze, with a smooth $2\frac{1}{2}$-inch bore, weighs with its carriage 185 pounds, and carries a shot weighing 17 pounds. This projectile is a solid elongated cylinder $14\frac{1}{2}$ inches in length, into the base of which is screwed an eyebolt for receiving the shot-line, the bolt projecting sufficiently beyond the muzzle of the gun to protect the line from being burned off in firing. When the gun is fired the weight and inertia of the line cause the projectile to reverse. The shot-lines used are of three sizes, designated by the numbers 4, 7, and 9, being, respectively, $\frac{4}{32}$, $\frac{7}{32}$, and $\frac{9}{32}$ of an inch in diameter. Any charge of powder can be used up to the maximum of 6 ounces. A range of 695 yards has been obtained with the No. 4 line under favorable circumstances. The range of the larger line is, of course, proportionately diminished. The No. 4 is only used where the vessel is thought to lie beyond the range of the larger lines, for the reason that it is not strong enough to sustain the hauling of the whip line on board—an intermediate line has to be supplied, requiring the expenditure of time and strength—and because it is not so easily hauled upon by the shipwrecked sailors as the larger one. The Hunt gun is also of bronze, of about the same size and weight as the Lyle, and not very different from it, except that it has a bore an inch larger and is attached to its carriage bed at the cascabel instead of resting on trunnions. Indeed, the peculiarity of the Hunt system is not in the gun, but in the projectile, which could be fired just as well from the Lyle gun if the latter were of sufficient caliber. This projectile consists of a cylindrical tube of tin, into one end of which is soldered a solid hemispherical piece of lead, which, when the projectile is placed in the gun, rests upon the cartridge, and upon discharge reverses its position like the Lyle shot and goes foremost. The shot-line, being fastened into a staple in the center of the inside surface of this piece of lead, is coiled in the tube

until the cavity is nearly filled, being kept in place by a coating of paraffin, which is sufficiently adhesive for the purpose, but does not materially retard its paying out as the projectile flies. The tube has a capacity for 320 yards of No. 4 line. In the outer end is placed a diaphragm of pasteboard with a circular hole in its center three-fourths of an inch in diameter, through which a portion of the other end of the line hangs out. When the missile is placed in the gun 4 or 5 inches protrude beyond the muzzle. Upon this portion four trapeziform wings are soldered at regular intervals to control the flight. Before firing the protruding end of the incased line is tied to another line coiled in a can, or otherwise so arranged as to permit it to be taken out without entanglement. When the discharge takes place the line in the can by its inertia and weight causes the line in the projectile to pay out, and when the latter is exhausted furnishes the supply for the remainder of the flight. The range obtained is about 40 yards greater than can be had with the Lyle projectile. The Massachusetts Humane Society uses this system altogether. The United States Service prefers the Lyle system, because where extreme range is not required it conveys a larger and stronger line to the shipwrecked; because it does not require the use of an intermediate line for hauling on board the whip-line (Mr. Hunt claims that the line he uses is strong enough, but I should not dare to trust it); and because the projectile can be used any number of times, while the Hunt projectile after once being fired, either in drill or service, has to be returned to the manufacturer to be refilled, or a new one must be obtained, involving expense and trouble.

The Cunningham rocket system may be said to be an application of the Hunt projectile to a rocket. It consists of a powerful rocket, at the rear end of which is a female screw that receives the pointed end of a sheet-iron tube 5 feet $9\frac{1}{2}$ inches in length and of equal diameter with the rocket. This tube is packed with 800 yards of No. 4 shot line which is connected with a shore line in the same manner as in the Hunt system, and is paid out in flight as from the Hunt projectile. The tube also takes the place of the stick in other rockets. The shore line can be of any size. The range of the rocket with a No. 4 shore line is from 700 to 1,000 yards, which is diminished with other lines according to their sizes. With any line it exceeds that of any other rocket I have seen.

Several considerations have determined the choice of the gun for general use in the Life-Saving Service in preference to the rocket, among which are the following:

(1) Within its range it performs the desired service equally as well as any rocket at much less expense. The cost of the Lyle gun and all its appurtenances, exclusive of projectiles, is $87.83. The lowest cost of any efficient rocket with appurtenances that I know of is not much

less. The only expense attending the use of the gun is the cost of the cartridge, say half a dime, except when occasionally a shot is lost, which can be replaced for $2. When a rocket is fired several dollars are expended. These facts are of consequence when considered in connection with the utility of frequent drilling.

(2) The gun is very easily handled and readily prepared for firing. Everything can be done almost as well in the dark as in the light, and, if the weather be cold, without taking off the mittens. The manipulation of the rockets I have seen and experimented with is not so simple.

(3) A rocket must be given considerable elevation in firing, whereby the line is carried high in the air—usually far above the stranded vessel—where it is exposed to the force of the wind, making it liable, in falling, to float wide of the mark and fail to drop across the vessel. The gun, on the other hand, can be given any elevation—even be depressed below a horizontal position if fired from a cliff—and the charge of powder can be graduated according to the distance the vessel lies from the shore, thereby greatly reducing the chance of failure.

A recent incident admirably illustrates the adaptability of the gun to exceptional situations. In the great storm of September last the keeper of the Hunniwells Beach Station, on the coast of Maine, was notified that a wrecking crew of 15 persons who were at work upon a vessel which had some time before struck upon Glovers Rock, some 5 miles distant from the station and out of sight, had hoisted a signal of distress. He put a heaving-stick, the Lyle gun, a shot-line, a whip-line, a breeches-buoy, and a spare line into the surfboat, and with his crew set out for the rock. Arriving, he found the wreckers in danger of being engulfed by the growing sea, and that the boat could not approach near enough to enable him to reach the rock with the heaving-stick. He therefore anchored his boat, set the shot-line box on the stern, lashed the gun upon the afterthwart, loaded it with a 1-ounce cartridge of powder, and fired, casting the line almost into the hands of the imperiled men. It was found impossible, however, to take them off with the breeches-buoy without great risk of their being dashed upon the projecting points of the rock. Fortunately, there was a small dory upon the rock, by means of which, with the use of the line, the whole number was drawn in six trips safely to the surfboat, which took them ashore through a sea which the keeper describes as as heavy as he ever saw. In the same storm the crew of the Lewes Station, Del., fired the gun from the upper window of a fish house and landed the crew of a vessel into the loft with the breeches-buoy.

For a vehicle in which to transport people from a wreck to shore after line communication has been established the breeches-buoy is generally used as in other countries. The life-car (which I believe to be the invention of Mr. Joseph Francis, of New Jersey, although this

is disputed by Capt. Douglas Ottinger, of the Revenue Marine Service, who claims to have devised it) is sometimes taken, however, especially where many persons are to be landed, and where the distance is too great to use the breeches-buoy. The car is a covered boat, made of corrugated galvanized iron, furnished with rings at each end, into which hauling lines are bent, whereby the car is hauled back and forth on the water between the wreck and the shore without the use of any apparatus. It is supplied, however, with bails, one near each end, by which it can be suspended from a hawser and passed along upon it like the breeches-buoy, if found necessary, as is sometimes the case where the shore is abrupt. The cover of the boat is convex and is provided with a hatch, which fastens either inside or outside, through which entrance and exit are effected. Near each end it is perforated with a group of small holes, like the holes in a grater, punched outward, to supply air for breathing, without admitting much, if any, water. It is capable of containing six or seven persons, and is very useful in landing sick people and valuables, as they are protected from getting wet. On the first occasion of its use it saved 201 persons.

In all other respects than those noted the beach apparatus is the same as is used elsewhere.

A difficulty that has not infrequently seriously obstructed the operations of rescue, and which, I suppose, is familiar to all institutions which use the apparatus, is the inability of the ship's company to intelligently and promptly cooperate with the rescuing force. Improvidence has been imputed to sailors as a characteristic to an extent that is probably unjust. However that may be, it is certain that as a rule they do not in advance make the preparation for the emergencies of shipwreck that instinctive regard for their own safety would be expected to prompt. One would naturally suppose that every intelligent sailor, at least every officer of a vessel, aware that there existed upon the coasts of nearly every country stations supplied with means of aiding their rescue if they should unhappily be cast ashore, would carefully acquaint himself with the methods employed. This is so far from being the case that tedious delays in the work of deliverance are frequently occasioned by their ignorance, which in some instances in the history of our service have nearly proved fatal. The inscriptions printed in English and French upon the tally boards or tablets which are sent out with the whip-line and hawser are explicit enough as to what is to be done after they are received, but they can not always be read, sometimes on account of darkness, sometimes because no one on board is familiar with either the French or the English language. Again, I have known instances in which sailors did not even know what to do with the shot-line sent them, and have with difficulty been made to understand that they were to haul it aboard.

In dealing with this trouble we have followed the example of the rocket service of the Board of Trade in England, and published a pocket manual containing complete instructions for cooperating with the station crews and showing by plain cuts the manner of setting up the parts of the apparatus sent on board. To this is added a list of the stations, with their locations, and other useful information relating to the Service. Each book is provided with a receptacle for cards, papers, etc., which makes the officers of vessels glad to get them and carry them in their pockets on account of the convenience they afford for the care of their small papers. Their value has been illustrated on several occasions of rescue, when the captains have stood, book in hand, and given directions from it as the operations progressed.

This device, however, has only partially remedied the evil. The distribution is not sufficiently general, in several nations not being made at all. I understand that in England and some other countries a knowledge of these matters is required as a qualification in officers of vessels. If the other maritime nations would also require this, the difficulties experienced would largely disappear. Emergencies arise, however, where, although the sailors well understand the part they have to take, progress would be greatly facilitated if there were some means of communicating between them and their cooperators on the shore, particularly at night. Such means would be advantageous not only on such occasions, but at other times, as when the shipwrecked, lured by the comparatively smooth appearance of the surf as viewed from seaward, attempt to land in their own boats, while it can be plainly seen from the shore that the venture must be fatal. I think I can safely say that more lives are now lost within the scope of station operations through these attempts than from any other cause.

The telephone lines which now extend along nearly all those portions of the coast on which contiguous stations are located make it easy to quickly concentrate the crews of two or more stations at any point where additional force is required, as in the case when several wrecks occur at the same time in the same neighborhood, and the double equipment at each station expedites this concentration by permitting the reenforcing crew to come unencumbered. A notable illustration of the benefit of such a combination of crews was the work achieved near Cape Henlopen in the great storm of September 10, 11, and 12 last, one of the most destructive that has ever visited our coast, when the crews of three stations, under the leadership of Capt. Clampitt, of the Lewes Station, rescued the crews of 22 stranded vessels—194 persons—by the use of every form of rescuing appliance—23 being landed with the surf boats, 16 with the self-righting lifeboat, 135 with the breeches-buoy, and 20 with the life-car, not a life being lost.

The telegraph and railroad systems of the country are also used to secure the services of the crews at scenes of rescue far remote from their stations. On two occasions the Cleveland crew has been called to Cincinnati, Ohio, and Newport, Ky., a distance of 240 miles, to render aid to the sufferers from inundations in the Ohio Valley. On the first occasion 1,200 persons were succored, on the second over 800. The crew of the Sturgeon Bay Ship Canal Station, Lake Michigan, was once called at night to Chocolay Beach, near Marquette, Mich., a distance of 110 miles. Proceeding by special train running at the highest attainable speed, and taking with them their beach apparatus and boat, they reached the beach at midnight, and through a blinding snowstorm and in spite of bitter cold, were able to board two stranded vessels and rescue 24 persons after every effort of the citizens had failed. Shorter journeys of from 15 to 30 miles by rail are frequently undertaken, especially where the railway skirts the shore, as it does on many parts of the coast.

At isolated stations, where aid from another station is not available, the keepers have authority to accept the assistance of volunteers, who are paid $3 each per day upon the certificate of the keeper, approved by the district superintendent.

After rescue the shipwrecked people are taken to the station and provided with every comfort it affords. They find hot coffee and dry clothing awaiting them, with cots for those who need rest and sleep. If any are sick or maimed, as is frequently the case, they are nursed and cared for until sufficiently recovered to safely leave; in the meantime medical aid is called in if practicable. For wounds and ailments requiring only simple and well-known remedies, recourse is had to the medicine chest, which is stocked with restoratives and medicines that can be safely used and provided with a handbook of directions. The sojourner also finds at hand a very fair library of books to relieve the tedium of his enforced detention.

The dry clothing is taken from a supply constantly kept on hand by the Women's National Relief Association, an organization established to afford relief to sufferers from disasters of every kind, and the libraries are the donations of the Seamen's Friend Society and of sundry benevolent individuals. Several newspaper publishers send their papers regularly to many of the stations. The food is prepared by the keepers or the station messes, who are reimbursed by the recipients if they have the means; if not, by the Government.

Occasionally unfortunate victims of shipwreck reach the shore to all appearances dead. In such cases the life-saving crews attempt their restoration according to the method for restoring the apparently drowned, in which they have been drilled as already described. When the Service was first organized we adopted the system then, and, I believe, still employed by nearly all life-saving organizations. It

is known as the Hall-Silvester method, containing features of each of the systems, formulated by Dr. Marshall Hall and Dr. H. R. Silvester. A discussion of the subject in the Life Boat Journal (February number, 1873), in which the "direct method," as it is called, recommended by Dr. Benjamin Howard, of New York, was brought to my attention, led to the adoption of the latter system with some slight modifications suggested by Dr. John M. Woodworth, late Surgeon-General of the United States Marine-Hospital Service. Dr. Frank Baker, professor of anatomy in the medical department of Georgetown University, who is also connected with the Life-Saving Service, has at my request made a very thorough examination of the various systems, and has submitted an exhaustive report upon them. He states his general conclusion as follows:

The different methods all have in view the expulsion of the vitiated air in the lungs and the introduction of fresh. To effect this, respiratory movements are stimulated. Hall does this by turning the patient on his face and compressing the thorax by pressure on the back, then turning him on the side and allowing the thorax to expand. The expulsion of air is but slight, but it is an excellent method of expelling fluids from the stomach and lungs. In Silvester's method the arms are first stretched at full length upward beside the head, then carried downward, pressing the elbows against the thorax. These motions are thought to alternately expand and contract the chest. It is difficult to understand how the first movement can produce an effective expansion, as the scapulæ are not fixed, and the muscles passing directly from the arms to the chest are inserted so high up on the thorax as to have but little, if any, effect. The second movement produces an expulsion of air, but not as effectively as in the method of Howard, by which the lower thorax and the abdomen are compressed, the diaphragm consequently pushed up, and the lungs emptied. This method is believed to be more efficient than any other that has been employed. No active inspiratory movement is made, the expansive resiliency of the chest wall springing back after compression being sufficient.

During the 12 years in which the "direct method" has been practiced in the Service 118 cases have come under the treatment of our crews. In this number of attempts at resuscitation 60 were successful and 58 unsuccessful. In some of the successful instances several hours elapsed after the patient was taken from the water before natural respiration was induced. Success has followed even after the patient has been pronounced dead beyond hope by reputable physicians. As to the results obtained by other methods I have been unable to secure any information.

Next to the success of the Service in saving life, that of its efforts in the saving of property is conspicuous. This is accomplished in getting vessels afloat when stranded, a work in which the surfmen are experts; in extricating them from dangerous situations; in pump-

ing them out when leaking; in running lines between wrecked vessels and tugs when it can not be done with ordinary boats; in rendering assistance in various ways; and in warning off vessels standing into danger. In the majority of casualties the surfmen succeed in saving the vessels and cargoes without any other aid than that of the ships' crews. When this is impossible they act in conjunction with the revenue cutters—which are equipped for rendering assistance in such cases—if these vessels are available, or assist, if necessary, any other relief sent.

The tabular statistics published in the annual reports of the service show, in reference to imperiled property, only the amount imperiled, the amount saved, and the amount lost within the field of station operations; but, in order to convey here a better idea of the value of the labors of the life-saving crews, I have had prepared a statement of their salvage work during the years 1888 and 1889. This statement shows that in 1888 the station crews saved, without any outside assistance, 194 vessels, valued, with their cargoes, at $1,495,550. The number of persons on board was 898. The number of vessels which they assisted other effort in saving was 88, the value involved being $2,170,500 and the number of persons on board 654. The aggregate number of vessels, therefore, which they saved and assisted to save was 282, the amount of property involved $3,666,050, and the number of persons on board 1,552. They also rendered assistance of less importance to 210 other vessels. In 1889 the crews saved, without outside assistance, 172 vessels, valued, with their cargoes, at $1,127,295. The number of persons on board was 823. The number of vessels which they assisted other effort in saving was 85, the value involved being $2,114,535 and the number of persons on board 623. The aggregate number of vessels, therefore, which they saved and assisted to save in this year was 257, the amount of property involved $3,241,830, and the number of persons on board 1,446. Assistance of minor importance was rendered to 253 other vessels. For all this it must be remembered they received no salvage.

But their usefulness as salvors of property does not end here. By the aid of the telephone lines, all of which are connected with telegraph stations, they give to the maritime exchanges and underwriters early notice of disasters, with information as to the condition of the vessels, the extent of additional aid required, if any, etc., or send directly to the nearest available place for tugs or other needed help, thus securing prompt assistance where delay would involve serious and perhaps fatal consequences. More valuable than this, perhaps, is the service rendered both to humanity and commerce in the prevention of disasters by the warning signals of the night and day patrol. Of course no estimate of the lives and property saved in this manner can be made. We only know the number of such

warnings given. Last year they were 217. They have reached as high as 240 in a year, and during any of the last six years have not been less than 200.

It is pertinent to inquire what it costs to maintain this system, and whether the results produced are proportionate to the outlay. The expenditures vary considerably from year to year, as do also the aggregate results produced, the difference depending upon the number of new stations added to the establishment and upon numerous contingencies. A summary of the expenditures and operations of any one year would therefore but imperfectly answer the inquiry. Such a statement, however, will be found interesting in other respects, and I give it in regard to the last fiscal year, as extracted from the annual report, not yet printed: The total expenditures were $965,-907.18, all but $163,454.03 of which was expended in the payment of the compensation of the officers and men and that of the clerical force—$712,567.95 being paid to the keepers and surfmen alone. There were 378 disasters to documented vessels within the scope of the Service. There were on board these vessels 3,106 persons, of whom 38 were lost. The estimated value of property involved was $6,343,880. Of this amount, $4,995,130 was saved and $1,348,750 lost. The number of vessels totally lost was 63. In addition to the foregoing there were 150 casualties to smaller craft—sailboats, rowboats, etc.—on which were 320 persons, of whom only 4 were lost. The property involved in these instances is estimated at $72,895, of which $59,310 was saved and $13,585 lost.

The results of all the disasters within the scope of the Service aggregate, therefore, as follows:

Number of disasters	528
Value of property involved	$6,416,775
Value of property saved	$5,024,440
Value of property lost	$1,362,335
Number of persons involved	2,426
Number of persons lost	42
Number of vessels totally lost	63

To this statement should be added 787 shipwrecked persons succored at the stations, the number of days' succor afforded being 1,732.

There were landed by the surfboats 435 persons, by the self-righting lifeboats 74, by the river life skiffs (at Louisville) 56, by other station boats 179, by the breeches-buoy 193, by the life-car 10, by other means 40. There were besides 24 persons rescued who had fallen from wharves, piers, etc. The details relative to the saving of property, etc., have already been stated.

It may be mentioned that the loss of life from documented vessels last year was unusually large. The year before it was only 12. The

average loss per annum since the introduction of the present system is 26.

The following is a general summary of the statistics of disasters that have occurred within the scope of the Service from the introduction of the present system in 1871 to the close of the last year:

Number of disasters	4,924
Value of vessels	$55,473,190.00
Value of cargoes	$26,246,584.00
Value of property involved	$81,719,774.00
Value of property saved	$60,352,092.00
Value of property lost	$21,367,682.00
Number of persons involved	42,864
Number of lives lost	[1] 505
Number of persons succored	7,903
Number of days' succor afforded	20,837
Cost of maintaining the Service	$9,172,208.86

We would probably obtain a better idea of the relation between the cost of maintenance and the results by taking the aggregate during the seven years since the adoption of the present rate of wages, commencing July 1, 1883, and afterwards giving the average per station. In 1883 there were 194 stations; 1884, 201; 1885, 203; 1886, 211; 1887, 218; 1888, 222; 1889, 225; making a total of 1,474 stations. The general cost and results may be summed up as follows:

Cost during 7 years	$5,791,184.05
Number of disasters	3,232
Value of property involved (vessels and cargoes)	$52,441,120.00
Value of property saved	$42,286,800.00
Value of property lost	$10,154,320.00
Number of persons on board	27,766
Number of persons lost	196
Number of shipwrecked persons succored at the stations	4,831
Number of days' succor afforded	12,402
Number of disasters resulting in total loss of vessels	482

The average number of stations was 210, and the average annual cost of maintenance per station was therefore $3,928.89. Other average results per station per annum are as follows:

Number of disasters	2.19
Value of property involved	$35,577.42
Value of property saved	$28,688.47
Value of property lost	$6,888.95
Number of persons involved	18.97
Number of persons saved	18.84
Number of persons lost (being 1 person to every 7 stations)	.13
Number of persons succored	3.27
Number of days' succor afforded	8.41
Number of disasters resulting in total loss of vessels (being 1 to every 3 stations)	.33

[1] This includes 30 lost from undocumented vessels (small craft).

It is to be regretted that no data exist from which a definite comparison of the results of disasters to vessels upon the coasts, before and after the establishment of stations thereon, can be drawn. Unfortunately no provision of law was made for the collection of statistics pertaining to disasters beyond the scope of the Service until 1874, when authority was given to gather them. From the time, however, that the present life-saving system began its work upon the coasts of Long Island and New Jersey, in 1871, all important data relating to casualties within its province have been secured. In 1849 and 1850, as I have before stated, the Government had erected upon these coasts boathouses containing surfboats and other life-saving appliances, each in charge of a keeper, for such effort as might be volunteered on occasions of shipwreck (a system somewhat similar to other existing volunteer systems), and although no definite record of the results of this experiment was kept, it is known that many lives were saved through the facilities it afforded. The number lost can not be ascertained. I have positively learned, however, of the loss of 512 persons during the 20 years from 1850 to 1870, and have authentic information that these figures indicate but a fragment of the reality. Yet they afford the basis for some comparison. They give, for instance, an average annual loss of at least 25 lives. During the 18 years of the existence of the present system the number lost upon this section of the coast has been 119, an annual average of only 7—a reduction of about 80 per cent—which would doubtless be largely augmented if the facts could be ascertained, and this, notwithstanding the number of disasters has greatly increased as a consequence of the growth of the commerce of the country, particularly that of New York and Philadelphia.

It will be observed, too, that the ascertained loss of 512 lives during the 20 years of the volunteer system, although confined to a very small section of the coast, is greater than that upon all the dangerous coasts which have come under the protection of the present system during the last 18 years. Yet this latter number (505) includes 30 lives lost from undocumented vessels (small craft), while the former does not embrace such. It also contains the lives of 28 wreckers lost from the steamship *Circassian* in 1876, on the Long Island coast, for whose rescue the breeches-buoy apparatus had been set up, but was deliberately and against the keeper's protest cast overboard by the wrecker in charge, for fear that his men would become frightened and avail themselves of it as the storm increased, while he hoped to float the vessel at high tide. If these be deducted, the number will be reduced to 447, and yield an average annual loss for the entire service less than that upon the New Jersey and Long Island coasts alone under the volunteer system. I may here remark that in making up the annual record of the loss of life under the present system, care

has always been taken to include every instance that could with any degree of fairness be said to have occurred within the field of the operations of the Service; the doubtful cases have been counted in, and among them are others than those specified above that could be deducted with equally good reason.

I have thus endeavored to present a sketch of the organization and methods of the Life-Saving Service of this country and to convey an accurate idea of its effectiveness. Doubtless the system appears to be an expensive and elaborate one, but it must be remembered that, putting aside entirely the consideration of the value of human life, which is beyond computation, it saves many times its cost in property alone, and that it fulfills the functions usually allotted to several different agencies. It rescues the shipwrecked by both the principal methods which human ingenuity has devised for that purpose, and which in some countries are practiced separately by two distinct organizations; it furnishes them the subsequent succor which elsewhere would be afforded by shipwrecked mariners' societies; it guards the lives of persons in peril of drowning by falling into the water from piers and wharves in the harbors of populous cities, an office usually performed by humane societies; it nightly patrols the dangerous coasts for the early discovery of wrecks and the hastening of relief, thus increasing the chances of rescue and shortening by hours intense physical suffering and the terrible agony of suspense; it places over peculiarly dangerous points upon the rivers and lakes a sentry prepared to send instant relief to those who incautiously or recklessly incur the hazard of capsizing in boats; it conducts to places of safety those imperiled in their homes by the torrents of flood, and conveys food to those imprisoned in their houses by inundation and threatened with famine; it annually saves, unaided, hundreds of stranded vessels with their cargoes from total or partial destruction, and assists in saving scores of others; it protects wrecked property, after landing, from the ravage of the elements and the rapine of plunderers; it extricates vessels unwarily caught in perilous positions; it averts numerous disasters by its flashing signals of warning to vessels standing into danger; it assists the customs service in collecting the revenues of the Government; it pickets the coast with a guard, which prevents smuggling and, in time of war, surprise by hostile forces. I might considerably extend the catalogue of its beneficent offices. I could tell of the valuable aid it has rendered to scientific research; of its contributions of rare specimens to the department of marine zoology in our National Museum; of the hotels, dwellings, mills, and other structures it has saved from destruction by fire; of its timely detection and prevention of burglaries and robberies, and of many other services inuring to the public benefit which it has incidentally rendered. But I must not detain the committee longer.

I have made a heavy draft upon its time and patience which nothing but the importance of the subject would justify. The conference sits in council charged with the responsibility of devising means to secure, if possible, a greater measure of safety to those who go down to the sea in ships. It is a responsibility of the gravest nature, in which we have an important share. We are to study the different methods of dealing with the contingencies of shipwreck; to compare the results of our individual experience and observations, and deduce for the consideration of the conference such rules of action as seem to us practicable and best for common adoption. Of course it is not apprehended that it is possible, or perhaps even desirable, that the diverse systems and methods pertaining to the various life-saving institutions of the world should be made uniform; but if the conference could have the benefit of a full exposition of all of them, perhaps some of the best features of each system might be selected and recommended for general extension. Under these considerations and with this view I have felt that I ought not to omit, even at the risk of being tiresome, the mention of anything essential to afford a just conception of the general character and scope of our Service, which is so unlike all other organizations established for similar purposes.

ADDENDA.

Since the preparation of this paper in 1889, the number of stations has been increased to 279. (See latest issue of Official Register for number and location.)

Station buildings now being erected are larger and conform to modern requirements. They cost from $8,000 to $12,000 each.

Telephone service has been extended to the greater portion of the Atlantic coast, some few stations on the Great Lakes, and short lines on the Pacific coast. Stations not on service lines are connected with local exchanges where practicable.

Assistant inspectors now make quarterly visits, instead of monthly, as stated on page 12.

District superintendents' salaries have been increased, ranging now from $1,900 to $2,200. Keepers of complete stations receive $1,000 per annum, and keepers of houses of refuge (where no crews are employed) $600. One surfman in each crew, designated as No. 1, receives $70, and other surfmen $65 per month while actually employed. Keepers and crews of life-saving stations are allowed one ration or commutation thereof at 30 cents per day. Crews are paid monthly (p. 12).

The active season on the Atlantic and Gulf coasts is from August 1 to May 31—10 months; on the Great Lakes, during the season of navigation, April to December; on the Pacific coast, the entire year. Floating stations: Louisville, Ky., 12 months; City Point, Boston, Mass., May to November.

Surfmen are selected from eligible registers provided by the Civil Service Commission. The examination is noneducational, being based on experience, physical condition, and age.

Keepers are appointed on the joint recommendation of the district superintendent and assistant inspector, who must certify that the person nominated is the best qualified available surfman in the district. Only surfmen in the service are eligible for appointment as keepers of life-saving stations.

Vacancies in the position of district superintendent are filled by competitive examination, all keepers in the district where the vacancy occurs not over 55 years of age being eligible to compete.

Selection is made by the general superintendent from the three keepers making the highest ratings in the examination.

Continuous lookout is kept at all stations, both by day and night, with beach patrol during hours of darkness and in foggy or thick weather. Two surfmen are assigned to each night watch, one of whom proceeds on patrol (in the same direction at the same time from all stations in a district, so far as practicable), while the other remains at the station on watch; on return of first man he takes station watch and the second man patrols in opposite direction.

The lifeboats now being furnished the stations are 36 feet in length, equipped with 35 to 40 horsepower gasoline engines, so constructed and installed as not to affect the self-righting qualities or occupy space available for passengers and crew, and arranged so engine stops automatically in the event of a capsize. Self-bailing surfboats, 26 feet in length, are being equipped with 8-horsepower twin-screw motors. By means of universal joints in the outboard shafts the propellers are folded snug against the hull of the boat in launching and landing through the surf.

JANUARY, 1912.